

# VARIABLES AND RESEARCH QUESTIONS

- An important criterion in IB internal assessment is to be able to identify **DEPENDENT**, **INDEPENDENT** and **CONTROL** variables in an investigation.

**DEPENDENT** and **INDEPENDENT** variables **CHANGE** during an experiment.

**CONTROL** variables **SHOULD NOT CHANGE** (or only by very small amounts not likely to affect the experimental results.)

The problem is then how to distinguish between the **INDEPENDENT** and **DEPENDENT** variables.

The **INDEPENDENT** variable is the one that the experimenter is free to change during the experiment. On graphs, it should always appear on the x-axis.

The **DEPENDENT** variable is the one she / he must observe changing and measure (y-axis)

For instance, in the research question: "What is the effect of different drinks on the time we sleep?"

**INDEPENDENT** = type of drink    **DEPENDENT** = sleep time

**CONTROL** variables = volume of drink, time drunk, state of tiredness etc.

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- Study the following **research questions** and try to decide which variable is **independent**, **dependent** and **control** (it is not generally possible to have more than one dependent and one independent variable)

1. How does the colour/shade of different flowers change with exposure time to sunlight?
  2. How is the time taken for food to go bad affected by cooking salt concentration?
  3. How does concrete setting time vary with temperature?
  4. Is there a difference in the amount of heat evolved by different types of "super-glue"?
  5. Is there a connection between the melting point of plastics and how much they will bend?
  6. How does wing area affect the flight time of a paper plane?
  7. Is there a connection between page edge colour and the age of books?
  8. Is there a relation between how fast a person moves through the rain and how wet they get?
  9. How does temperature vary with height at different points on the earth's surface?
  10. How does temperature vary with height?
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In IB **PLANNING** exercises a student must find a research question which responds to the teacher's prompt, but the teacher may never give students the independent variable

For example for a student to find research question No.1 the teacher must have given a prompt like: "Investigate a factor affecting plant colour".

- Of course the teacher can be more demanding and just say: "Investigate an aspect of plant photchemistry" in which case the student must decide independent **AND** dependent variables.

Find possible teacher prompts for the research questions 3, 4 and 5

# VARIABLES AND RESEARCH QUESTIONS

An important criterion in IB internal assessment is to be able to identify DEPENDENT, INDEPENDENT and CONTROL variables in an investigation.

DEPENDENT and INDEPENDENT variables CHANGE during an experiment.

CONTROL variables SHOULD NOT CHANGE (or only by very small amounts not likely to affect the experimental results.)

The problem is then how to distinguish between the INDEPENDENT and DEPENDENT variables.

The INDEPENDENT variable is the one that the experimenter is free to change during the experiment. On graphs, it should always appear on the x-axis.

The DEPENDENT variable is the one she / he must observe changing and measure (y-axis)

For instance, in the research question: "What is the effect of different drinks on the time we sleep?"

INDEPENDENT = type of drink    DEPENDENT = sleep time

CONTROL variables = volume of drink, time drunk, state of tiredness etc.

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Study the following **research questions** and try to decide which variable is *independent*, *dependent* and think of **3 control variables** (it is not common to have more than one dependent variable and one independent variable)

1. How does the colour/shade of a flower change with exposure time to sunlight?
2. How is the time taken for food to go bad affected by *cooking salt concentration*?
3. How does concrete setting time vary with *temperature*?
4. Is there a difference in the amount of heat evolved by different *types of "super-glue"*?
5. Is there a connection between the *melting point of plastics(type)* and how much they will bend?
6. How does *wing area* affect the flight time of a paper plane?
7. Is there a connection between page edge colour and the *age of books*?
8. Is there a relation between *how fast* a person moves through the rain and how wet they get?
9. How does temperature vary with height at *different points* on the earth's surface?
10. How does temperature vary with *height*?

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In IB PLANNING exercises a student must find a research question which responds to the teacher's prompt, but the teacher may never give students the *independent variable*

For example for a student to find research question No.1 the teacher must have given a prompt like: "Investigate a factor affecting plant colour".

Of course the teacher can be more demanding and just say: "Investigate an aspect of plant photochemistry" in which case the student must decide independent AND dependent variables.